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ABSTRACT

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DETECTING REFLECTION-IN-ACTION IN PRESERVICE ELEMENTARY SCIENCE TEACHERS

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Detecting Reflection-in-Action in

Preservice Elementary Science Teachers

Abstract

This study draws on a conceptualization of the nature of professional knowledge called **"Reflection-in-Action"** put forth by Donald Schon, and seeks to determine whether it is applicable, and appropriate, to studying the way in which education students make sense of practical teaching experiences offered in methods courses. Schon's ideas are taken to the context of teacher education, and an analytical scheme for applying the catergories of reflection-in-action to clinical supervision dialogue is proposed. A conceptualization of the "cycle of reflection" is developed, and a "clue structure," or set of criteria, for detecting reflective activity in clinical supervision is put forth. The use of the clue structure is illustrated with detailed analysis of excerpts from the clinical supervision dialogue with an elementary science methods student.

This paper presents an analytic, exploratory study into the manner in which preservice elementary school teachers think about their early science teaching performances. The technical term for the particular kind of thinking the author sought is "reflection-in-action," a term put forth by Donald Schön in his recent and promising conceptualization of the nature of professional thinking.

The study took place in a methods course field experience, wherein third-year education students were given opportunities to teach science lessons to children in an elementary school. The research problem was to determine whether Schön's conceptualization of reflection-in-action is applicable and appropriate to studying the way in which methods students make sense of their teaching performances. The study entailed the development and assessment of a "clue structure," or set of criteria, for detecting reflection-in-action. Techniques of clinical supervision were utilised to guide the study of teaching, thus the approach entailed the analysis of clinical supervision dialogue. Excerpts of supervision dialogue are presented, together with a detailed analysis illustrating the use of the clue structure in detecting reflection-in-action.

The Development of Teacher Concerns

In order to establish the context for the study, it is helpful to consider a conceptualization by Fuller and Bown (1975) regarding the process of becoming a teacher. According to this conceptualization, beginning teachers typically change their "teacher concerns" as they move through preservice to inservice teaching (pp. 38-39):

> Preteaching concerns - Fresh from the pupil role, education students who have never taught are concerned . . . about themselves. They identify realistically with pupils, but with teachers only in fantasy. They have not experienced the realities of the teaching role. Education courses which deal with the teacher's realities seem to them "irrelevant." The identification with pupils manifests itself at the beginning of observation, when they are often unsympathetic, even hostile, critics of the classroom teacher whom they are observing.

Early concerns about survival - At first contact with actual teaching, however, education students' concerns change radically. Their idealized concerns about pupils are replaced by concerns about their own survival as teachers. They are concerned about class control, their mastery of the content to be taught, and evaluations by their supervisors. They wonder if they will ever learn to teach at all. This is a period of great stress.

Teaching situation concerns - Concerns about limitations and frustrations in the teaching situation, about the varied demands made on them to teach, not just survive, are added on to self-concerns. Education students who are teaching now become concerned about methods and materials which were the focus of education courses taken previously. They find they learned content well enough to reproduce it on an exam but not well enough to explain it to someone else, to answer questions, or to give examples.

Concerns about pupils - Preservice teachers express deep concerns about pupils, about their learning, their social and emotional needs, and about relating to pupils as individuals. But they may be unable to act on these concerns. Flooded by feelings of inadequacy, by situational demands and conflicts, they may have to lay aside these concerns until they have learned to cope with more urgent tasks, such as being heard above the din.

In previous empirical work with student teachers, Fuller (1969) found no evidence to support the proposition that beginning teachers are concerned with instructional design, methods of presenting subject matter, assessment of pupil learning or tailoring content to individual pupils. Yet these matters are typically dealt with before student teaching in education courses. Although her study involved education students only during their practicum experiences, Fuller drew insightful implications for their methods courses (p. 219):

> Information about concerns during this pre-teaching phase may actually be of more interest to many teacher educators than information about concerns during student teaching. First actual teaching, though stressful, is generally reported to be of more interest and benefit than other experiences offered in teacher education programs. Lack of interest is a problem before, rather than during student teaching.

The practical problem occurring in methods courses, as pointed out by this conceptualization, is not unfamiliar. It seems fair to say that method students often attend to matters that are of more concern to them than the theoretical perspectives of their instructors. Will they be liked by their students? Can they control a class? Is there any hope of getting a job? Their preoccupation with "preteaching concerns" and "early concerns about survival" may indeed inhibit their

understanding of pedagogical theory. A goal for teacher educators may therefore be to help preservice teachers overcome their self-concerns so that they might develop concerns about pupils. A more fundamental goal would be to create practical contexts to serve as foundations from which methods students might better understand theoretical perspectives about teaching methodology.

Assuming that actual classroom experience would enhance the development of teaching situation and pupil concerns, and that theories of pedagogy might be better understood through the examination of practice itself, a logical approach toward a solution of this problem would likely entail the inclusion of school-based experience in the methods course. Furthermore, educational researchers might strive to operationalize the blend of theory and practice in methods courses by studying the stages through which beginning teachers move in learning to reflect upon their practice.

Significance of the Problem

Implicit in the conceptual orientation of this work is the assumption that a particular kind of thinking about teaching will enhance the process of becoming a teacher. Not only is there a need for a practical context in which methods course material can be embedded, but there is also a need for methods students to understand that context. Here, teaching is regarded as a practical, disciplined art. Good teaching depends upon insight, and insight comes from reflection. It follows that there is a need for an appropriate conceptual framework that will drive reflection among preservice teachers, detect it, and allow investigators to research it.

Reflection-in-action

In The Reflective Practitioner: How Professionals Think in Action, Donald Schön (1983) has presented a conception of "knowledge-in-action," which challenges

the traditional school of thought regarding the nature of professional knowledge -- what he calls "Technical Rationality" (p. 21):

> According to the model of Technical Rationality -- the view of professional knowledge which has most powerfully shaped both our thinking about the professions and the institutional relations of research, education and practice -- professional activity consists in instrumental problem solving made rigorous by the application of scientific theory and technique.

Schön refutes the notion that a science-like corpus of knowledge can "drive" practice, and that it can lead to predictability and control in practical affairs (pp. 48-49):

> Among philosophers of science no one wants any longer to be called a Positivist, and there is a rebirth of interest in the ancient topics of craft, artistry and myth -- topics whose fate Positivism once claimed to have sealed. It seems clear, however, that the dilemma which afflicts the professions hinges not on science per se but on the Positivist view of science. From this perspective, we tend to see science, after the fact, as a body of established propositions derived from research. When we recognize their limited utility in practice, we experience the dilemma of rigor or relevance. But we may also consider science before the fact as a process in which scientists grapple with uncertainties and display arts of inquiry akin to the uncertainties and arts of practice.

In reconsidering the nature of professional knowledge, Schön honors the practical competence of professionals in divergent situations, and searches for ". . . an epistemology of practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict" (p. 49).

> When we go about the spontaneous, intuitive performance of the actions of everyday life, we show ourselves to be knowledgeable in a special way. Often we cannot say what it is that we know. When we try to describe it, we find ourselves at a loss, or we produce descriptions that are obviously inappropriate. Our knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is in our action.

Schön is more interested in the process of professional decision making than in the decisions themselves. He conceives of "reflection-in-action" as a means by which professional knowledge is put into play, in terms of both "problem setting" and problem solving (p. 40):

> In real world practice, problems do not present themselves to the practitioner as givens. They must be constructed from the materials or problematic situations that are puzzling, troubling and uncertain.
>
> When we set the problem, we select what we will treat as the "things" of the situation, we set the boundaries of our attention to it, and we impose upon it a coherence which allows us to say what is wrong and in what directions the situation needs to be changed. Problem setting is a process in which, interactively, we name the things to which we will attend and frame the context in which we will attend to them. (italics in the original)

According to the model of reflection-in-action, when a practitioner sets a problem in a situation, he surfaces "fundamental principles" that are ". . . closely connected both to his frames and to his repertoire of exemplars" (p. 317). For Schön, fundamental principles represent theory, or conceptual apparatus, in use. When the practitioner goes about his work, he engages in a "reflective conversation" with the situation. Past experiences are brought to bear on the situation; frames are imposed and bring to attention certain aspects of phenomena; problems are set and actions that entail certain solutions are formulated. What the practitioner "sees" in the situation depends fundamentally on his conceptual repertiore and the way in which his reflection proceeds.

Referring to the clinical supervision of methods students for a moment, it is plausible that problem setting is one of the activities in which the supervisor and the student engage as they discuss teaching performance. As the discussion proceeds, and the student confronts new representations of his or her classroom practice, he or she is faced with a new task. The supervisor must, as Schön would say, reframe the problematic situation (p. 129):

> The teacher (supervisor), who attributes the student's predicament to his way of framing the problem, tries to make sense of the problematic situation he is encountering at second hand. The situation is complex and uncertain, and there is a problem in finding the problem. (parenthetical addition)
>
> Because each practitioner treats his case as unique, he cannot deal with it by applying standard theories or techniques. He must construct an understanding of the situation as he finds it. And because he finds the situation problematic, he must reframe it.
>
> The second element of reflection-in-action consists of experiment, played out

to discover what consequences and implications can be made to follow from the reframed problem (p. 131):

> In order to see what can be made to follow from this reframing of the situation, each practitioner tries to adapt the situation to the frame. This he does through a web of moves. Within the larger web, individual moves yield phenomena to be understood, problems to be solved, or opportunities to be exploited.

Finally, reflection-in-action involves a reflexive interchange between the practitioner and the situation (pp. 131-132):

> But the practitioner's moves also produce unintended changes which give the situation new meanings. The situation talks back, the practitioner listens, and as he appreciates what he hears, he reframes the situation once again.

Schön's conceptions of problem setting and reframing are particularly useful when taken to the context of preservice teacher education. It is reasonable to suspect that through reflection methods students will come to new understandings of the effects of their teaching practice, and that the moves made in doing so match the elements of Schön's conception.

The process of supervision could be said to involve a three-way "reflective conversation" among the teacher, the record of his or her teaching, and the supervisor. Schön speaks of the reflective process as being cyclic in character; it uncovers new understandings of events, which in turn, fuel further reflection (p. 132):

> In this reflective conversation, the practitioner's effort to solve the reframed problem yield new discoveries which call for new reflection-in-action. The process spirals through stages of appreciation, action, and reappreciation. The unique and uncertain situation comes to be understood through the attempt to change it, and changed through the attempt to understand it.

Beyond the matter of coming to appreciate and understand events in a "new light," the reflective practitioner engages in moves that have to do with the choice of action that will be taken. These moves comprise the rigor of the practitioner's "on-the-spot experimenting" (p. 141):

When the practitioner sees a new situation as some element of his repertoire,

> he gets a new way of seeing it and a new possibility for action in it, but the adequacy and utility of this new view must still be discovered in action. Reflection-in-action necessarily involves experiment.

While the experimental aspect of reflection-in-action is recognized as being integral to the day-to-day work of practitioners, the present paper focuses on problem setting and reframing. These are the categories that address the epistemological features of "seeing" possibilities for action in practical situations. By definition, problem setting and reframing are the beginning points of reflection-in-action.

To summarize Schön's conception of reflection-in-action, it is worth noting the characteristics that markedly distinguish it from the traditional view of professional knowledge. Schön draws our attention to the dichotomies on which Technical Rationality rests: the separation of means from ends, of research from practice, and of knowledge from doing. According to the model of reflection-in-action, practice is a kind of research. In their problem setting, practitioners frame the means and ends of their action interdependently; what they do in certain situations depends upon what they "see" in those situations, namely the practical problems that they set and frame.

Methodology

The task pursued next is to demonstrate the linkage between Schön's theoretical perspective and actual events in the clinical supervision of methods students. This has entailed developing and assessing a "clue structure" for detecting reflective activity on the part of methods students as they examine their own teaching performances. Before presenting the clue structure and demonstrating its use, it is appropriate to elaborate upon the methodology utilised in the analysis of data.

Initially, the data for this study consisted of transcriptions of five lessons that were taught by methods students, along with the discussion of those lessons

that ensued between the investigator (clinical supervisor) and each person who taught. The data were collected in late October and early November of 1984 during the latter part of the methods course, just prior to the students' first practicum.

The analysis of the data was modeled after an approach put forward by Roberts and Russell (1975) which draws on "informal philosophical analysis" (Kneller, 1966) to examine practice. Informal philosophical analysis is concerned with systematic conceptualization of terms employed to discuss important events in practice, and it is grounded in a demonstrable linkage between theoretical perspectives and issues of everyday life. Thus, in educational research, informal philosophical analysis is rooted in the events of educational practice itself, and indeed the products of informal analysis may comprise the bases from which implications for educational practice may be derived. The Roberts/Russell approach first draws on a systematic theoretical perspective as the source of an "analytical scheme", or set of categories for the analysis, and then proceeds to develop a "clue structure," that is a set of criteria for identifying instances of events.

Development of the Analytical Scheme

The analytical scheme was developed theoretically from two of Schön's categories: problem setting and reframing. Problem setting, in summary, is the process by which the practitioner identifies the problematic phenomenon of the situation to which he or she will attend, and frames the context in which he or she will attend to it. Reframing is "seeing" in the situation new particulars that give rise to new understandings of the problematic phenomenon, as well as new possibilities for action in the situation.

When shifted from Schön's contexts (architecture, psychiatry and town planning) to the present context of teacher education, the initial theoretically derived analytical scheme required refinement. Two categories, adapted from

Fuller and Bown's (1975) developmental conceptualization of teacher concerns, were added to Schõn's two categories: (1) the notion that in becoming a teacher, education students learn to interpret classroom events from pupil-centered perspectives, rather than perspectives that are teacher-centered, and (2) the point that preservice teachers rely on personal experience as a student to assist them in assembling meaning from these pupil-centered perspectives.

Development of the Clue Structure

Upon inspection of the data, it was clear that "acts of reflection" (consistent with Schön's theoretical formulation) had to be distinguished from "acts of rationalization" on the part of the methods students. The latter consist of moves undertaken to justify, or defend, a particular teaching behavior. Acts of rationalization were common to all five of the methods students, particularly during the initial stages of discussion about their teaching performances. Acts of reflection are very different in nature. They involve moves undertaken to play out the implications derived from various perspectives, or theoretical lenses, employed to make sense of the methods students' teaching experience.

Acts of reflection were seen to occur in three phases, which may collectively be referred to as a "cycle of reflection." As the data were analysed, the cycle of reflection became more and more evident in the supervisory dialogue and, eventually, the conceptualization of the reflective cycle served as the basis from which the clue structure was developed.

The reflective cycle was conceptualized, in the main, to deal with repeating patterns of "negotiation about practice" that can be seen in clinical supervision dialogue. The cycle consists of three phases, which are quite distinct in character, but which lead into one another in a regular fashion. It should be made clear that these phases are analytic devices, and that therefore they do not always occur in groups of three and only once in a cycle. They are qualitatively different

components of reflection in clinical supervision discussion.

Phase I - Initial Problem Setting

In phase one of the cycle an "initial problem" is found in the teaching. The problem will usually be shaped and somewhat changed by the end of the cycle, thus the qualifier "initial." The teacher or the supervisor can begin this phase by calling to attention certain aspects of the teaching, or of the classroom events more generally, which are problematic. When the problematic phenomenon is named by the teacher, self-concerns are sometimes exposed in the process. However, this is more evident at the beginning of the supervisory discussion. The framing of the initial problem allows the teacher to formulate a conclusion(1) about the problematic phenomenon, as well as an implication(1) for future practice. This sets the discussion up for the second phase of the reflective cycle. (The significance of the designation "(1)" is to mark the conclusion and implication as initial.)

Phase II - Reframing

In this phase, the problematic phenomenon is re-examined from one, or perhaps several theoretical platforms. Reframing does not usually occur only once, but several times. Often, counter examples are constructed and contrasted to the problematic phenomenon. In addition, there is usually a shift from teacher-centered interpretations of classroom events, to interpretations that are pupil-centered. As the consequences of certain pupil interpretations are played out, the teacher is sometimes requested to reflect on his or her personal experience as a student to help make sense of the pupils' perspectives. Sometimes the supervisor offers anecdotes from his own personal experience to make a point. The result of the reframing process is a deeper understanding of the problematic phenomenon, based on the insights derived from the alternative perspectives and theoretical platforms used to examine it.

Phase III - Resolve

The resolve is the product of all of the work done in phase two. A new conclusion(2) about the problematic phenomenon is formulated, and a new implication(2) is often derived.

The reflective cycle occurs within an "episode" of dialogue, which is that portion of the discussion devoted to a particular topic, such as classroom management, pacing, questioning, or an incident in the lesson.

The Clue Structure

The clue structure for detecting reflective activity in supervisory dialogue has been crafted from the concept of the reflective cycle and refined through repeated

application to the data. There are four clues, which are stated here in the form of questions:

> Clue 1: Can the phases of the reflective cycle be "seen" in the dialogue? Is there a period of reframing activity?
>
> Clue 2: Is there evidence of a change in the perspective from which a classroom phenomenon is viewed? Specifically, does the teacher make a shift from using teacher-centered to using student-centered interpretations of the classroom event?
>
> Clue 3: Does reframing result in a change in the conclusions about the problematic phenomenon or in the implications that are derived for practice? That is, is there a change in the "I should have's"?
>
> Clue 4: In the course of reframing, does the teacher draw from his or her personal experience as a student to make sense of the pupil's position?

Analysis: Using the Clue Structure

Excerpts of a clinical supervision discussion with Wendy are presented to show how the clue structure was applied and tested. First, it will be useful to look into the introduction of Wendy's lesson, which she taught to a class of grade five-six students in an elementary school. The lesson, which dealt with environmental factors, began with a review of the previous day's activity when the elementary students conducted an experiment to determine what type of light conditions isopods prefer:

3	Teacher:	O.K., I see you've already been peeking in there . . . that's part of our project (refers to the buckets of pond water). That's all right. You've been looking at environmental factors I've been told. Does anyone want to tell me what an environmental factor is? Yes?
4	Student:	Air pollution.
5	Teacher:	Air pollution, O.K.
6	Student:	Water pollution.
7	Teacher:	Sorry?
8	Student:	Water pollution.
9	Teacher:	Water pollution, O.K. I think you were perhaps using

isopods. Were you working with isopods? What sort of environmental factors did you find? Yes, Harry?

10 Harry: That they like going to corners and, usually, dim parts of the runway.

11 Teacher: So what's the environmental factor?

12 Harry: That they like going to the dim parts.

13 Teacher: The dim parts. Yes?

14 Student: Isopods prefer finer sand and dimmer parts.

15 Teacher: Uhmm uhmm. Anything else?

16 Students: (silence)

17 Teacher: Would there be any other environmental factors that you can think of? No? Is there anything else here Tom?

18 Tom: Uhmm, well . . . the babies aren't used to the dim light and so they move to the light. And . . . I don't know.

19 Teacher: Anything else? No? O.K., we're going to look at environmental factors in a little bit different way.

The clinical discussion about the introduction of the lesson is presented next in order to display for the reader how the clue structure is used to detect the three phases of the reflective cycle and reflective activity in the supervisory dialogue. The dialogue is broken up into segments to allow for analytical comments to be made in the text.

(T = (Teacher) Wendy, C = Clinical Supervisor)

39 C: O.K., well let's begin just where you begin speaking here on page (85), #3. The kids were peeking in the buckets just while Mr. X was introducing you, is that right? Did you want to read out loud, or would you like me to?

40 T: Whatever.

41 C: O.K., "I see you've already been peeking in there . . . that's part of our project. That's all right. You've been looking at environmental factors I've been told. Does anyone want to tell me what an environmental factor is? Yes?" And the student says, "Air pollution." And you say, "Air pollution, O.K." And another student says, "Water pollution." "Sorry?" "Water pollution." "Water pollution, O.K. I think you were perhaps using isopods. Were you working with isopods? What sort of environmental factors did

you find? Yes Harry?" "That they like going to corners and dim parts of the runway." So what was the environmental factor?" "That they like to go to the dim parts." "The dim parts. Yes?" Does anything cross your mind yet?

42 T: Do you want me just to cut in on you as you're going along?

43 C: Yes.

Reflective Cycle 1: Phase I -- Initial Problem Setting

44 T: O.K. Well the first thing I notice is that I say "O.K." far too often . . . which I wasn't aware of. But when I started this, I was very unsure how to open the lesson. How to . . . other than just say, "You've been talking about environmental factors," I really didn't feel that I had a good opening line. And I find this all the way through. Like, I wasn't listening all that closely to what the kids were saying. Like, my response to them . . . I was listening to them, but I didn't respond in that manner.

45 C: Why do you say that?

46 T: Well, there's one instance that I noticed later on when I cut in on a student as he was talking. But that was when he had answered with exactly what I was looking for.

47 C: And you got excited.

48 T: Yes. But I found I was repeating the students' answers quite a bit. Now, whether that's wrong or right, I thought I should have tried to get the kids to say a little bit more.

49 C: Why would you want to do that?

50 T: To clarify their meaning to both myself and the rest of the class, and try to see why they were coming up with those answers.

51 C: Now, can you see an example here on the page that would illustrate that?

52 T: Well, O.K., with these first two -- air pollution and water pollution -- I understood where they were coming from, but whether the rest of the class did or not . . . And that wasn't what I was looking for; that's why I brought up isopods.

53 C: Oh I see. So "air pollution" and "water pollution" really didn't . . . really weren't examples of environmental factors?

54 T: They weren't the ones I was looking for. I wanted to get them on to thinking about the light, and what they had been doing with isopods.

55 C: Did air pollution and water pollution, given as examples of an environmental factor, satisfy what you expected them to know about the word, or the term "environmental factor?"

56 T: I didn't expect them to come out with things like that.

57 C: Yes, neither did I.

58 T: I found that several times throughout this . . . that they had a lot more knowledge than what I would have expected them to have at that stage.

59 C: Was that scary for you?

60 T: Yes, definitely.

61 C: I guess on the one hand you want them to tell you what they know, but you want to be able to handle it at the same time.

62 T: That's right.

63 C: And to sort of shape it into the meaning you want. O.K.

64 T: Again, I can see some of this causing me to be uneasy because I didn't know what they'd covered already, or what they'd had previously.

65 C: Sure. Actually, right now in terms of your development, you know very little about kids compared to what you will know about them.

66 T: As far as what they learn in school. Also, down here where the one fellow said that the isopods like to go to the dim parts, I think in that case . . . because that was pretty close to what we were looking for, I should have gotten him to give a little bit more on that.

67 C: How could you have done that?

68 T: Right now I honestly don't know. Perhaps get him to explain it in a different way or . . .

69 C: O.K. . . .

This first portion of the dialogue illustrates Phase I of the reflective cycle -- the initial problem setting. First, in utterance 44, Wendy frames the problematic phenomenon:

> Like, I wasn't listening all that closely to what the kids were saying. Like, my response to them . . . I was listening to them, but I didn't respond in that manner.

Second, Wendy's initial view leads her to name an implication(1) for practice in utterance 48, and again in utterance 66:

> . . . I thought I should have tried to get the kids to say a little bit more.

Finally, in utterance 54, Wendy states her conclusion(1) about the problematic phenomenon, namely, that the students didn't demonstrate that they understood the

concept of environmental factor:

> They (air pollution and water pollution) weren't the ones (examples of environmental factors) I was looking for.

Now let us return to the discussion of the lesson, which moves into Phase II of the reflective cycle -- the reframing activity:

70 T: On page (86) #12.

71 C: Right. I'm just looking up into the discourse that happens just before that point. To just briefly summarize it, you ask for examples of environmental factors, probably to get to their understanding of the term or the concept. And they give you things that you weren't expecting . . . and you go with the flow. "Air pollution, O.K." Someone else says "Water pollution." Do you see what I mean? And then you make an adjustment . . .

72 T: To get them back on track.

73 C: To get them back on track. So, "I think you were perhaps using isopods. Were you working with isopods?" They must have nodded their heads, right? "What sort of environmental factors did you find? Yes, Harry?" So we're back on to environmental factors and isopods, in the context of isopods, and we're looking for light, moisture, temperature and things like that.

74 T: Actually just light. They hadn't done the other two.

75 C: O.K. "They like going to the corners and usually the dim parts of the runway." Well, I suppose what he said isn't really an environmental factor is it?

76 T: No. I was trying to get him to tell me . . . not where they had gone, but . . .

77 C: But to just use the word "light". And so what's wrong with what you did? "So what's the environmental factor?"

78 T: And he just repeated what he had said before, basically. Except he did shorten it. I suppose I was still concerned at that time . . . I was still very nervous at that time and I was trying to get him to say, "light" and nothing else, sort of thing.

79 C: Well, you see it's not as bad as you think . . . I don't think. He's talking about their activity and you want him to say, "light." "So what was the environmental factor?" You're focusing him in and then he repeats the same thing.

In the passage above, the supervisor has introduced Wendy to a different way

of viewing the problematic phenomenon. Although he doesn't explicate the difference, he judges the teaching performance in the introduction of the lesson favorably. This he does by focusing, in utterance 77, on Wendy's question, "So what's the environmental factor?" He bases his judgement on the intention of the question, namely to have the student identify the environmental factor as "light."

The reframing activity continues later on in this episode, but in the next short passage, Wendy moves directly into Phase III of the cycle -- the resolve:

80 T: Well, actually, when he answers he does say that they like to go to the dim parts, so . . . seeing it now like . . . he has picked out what I was looking for.

81 C: O.K. (pause) And things continue to flow along quite nicely. You're shaping the ideas, I think, quite nicely. "Teacher: The dim parts. Yes?" And then, "Isopods prefer finer sand and dimmer parts." And then the "Anything else?", and silence after that. How do you read that?

82 T: (pause) I don't remember from the actual time. Uh, . . .

83 C: It was sort of like . . . that was it. They'd given you everything that they had. "Would there be other environmental factors that you could think of?" Tom says, "Well the babies aren't used to the dim light and so they move to the light. And I don't know . . ."

84 T: I actually think I should have left it the way it was instead of, you know, kept pushing for something else . . . for them to say, "light" and nothing else. And I think that's . . . from my understanding in looking at in now . . . that's what I was doing. I didn't accept what they said about going to the dim parts. I wanted them to explicitly say "light" and nothing else.

In this portion of the discussion, Wendy has formulated a new conclusion(2) about the problematic phenomenon in utterance 80, as well as a new implication(2) for practice in utterance 84. This does not necessarily mean that she has used the supervisor's frame (utterance 77) to do so, but rather that the supervisor's reframing has triggered Wendy's own reframing of the problematic phenomenon.

Thus far, the analysis of the supervisory dialogue has illustrated the use of Clue 1 and Clue 3 of the Clue Structure: That is, the three phases of the reflective cycle are evident in the dialogue (Clue 1), and there is a change in

Wendy's "I should have's" (Clue 3). The remaining two clues will be illustrated in the final portion of discussion in this episode, which begins with the supervisor resuming the reframing activity:

85 C: Well do you think that you pushed them too hard?

86 T: Actually I don't think so, no. Because they didn't . . . they didn't react badly to it or anything. They were still all with me and everything at the time, so . . .

87 C: Do you think that it's important to push them a little bit?

88 T: In some cases, yes.

89 C: Well, you want to deliver sort of a challenge, don't you? Give them something to do and have a worthwhile purpose for them doing it? I don't know if they'd like it very much if you gave them all the answers.

90 T: No, no. Certainly not. I can see that.

91 C: In fact, that might really backfire, you know. If you were to give them all the answers.

92 T: It would be boring for them.

93 C: Let them off the hook a little too easily. What do you think would happen?

94 T: I think they'd get distracted very easily. They wouldn't, on their own . . . they wouldn't develop because children usually have that curiosity for starters . . . it's teachers who end up stifling it in them. That's my personal opinion, however.

95 C: What makes you say that?

96 T: Why do I say that?

97 C: Your own experience?

98 T: My own experience, yes.

99 C: What happened?

100 T: Nothing in particular that I can remember, but I know that I was very enthusiastic when I started school, and I was until about junior high.

101 C: Uhmm uhmm.

102 T: And then I had a lot of old teachers who really didn't care what you were doing . . . and . . . I used to get away with a few tricks . . . you know, you'd hand in an assignment with the middle part missing out of it

and they'd never notice.

103 C: Oh heck. Gee whiz.

104 T: And I found that they weren't interested in what you were doing. They had their list of what to get through and that was it. And they really didn't care how they did it. That sort of really turned me off for a while.

105 C: They didn't challenge you.

106 T: No, not at all.

In this passage, the supervisor began the reframing activity with Wendy's implication(2), which she stated in utterance 84. There she said that she should not have "pushed" the students to say "light" and nothing else. The supervisor's frame had to do with challenging students, and he equated this with the "pushing" metaphor. Wendy reflected on her own personal experience as a student in order to support her claim that when teachers do not challenge, they end up stifling childrens' curiosity. The passage thus illustrates the use of Clue 4 (reflecting on personal experience as a student). Let us now return to the discussion for the remainder of the dialogue concerning the introduction to Wendy's lesson:

107 C: O.K., well I like what you're doing here . . . pushing them a bit. And to be honest with you, that . . . you know that your questioning technique is quite clear . . . I think the questions are clearly delivered. And when something isn't quite right, and you want to communicate that you're pushing . . . that comes across quite clearly to kids. I think due to the evidence we have here. They are actually satisfying your push. Do you know what I mean?"

108 T: Uhmm uhmm.

109 C: A lot of times beginning teachers have problems with questions. They find that their questions aren't explicit enough . . . that the meaning of the question is slightly ambiguous, and the kids struggle to find out what it is that the teacher wants. And so quite often you'll find that a beginning teacher will ask a question and then there's silence. Nobody knows what he wants. So he repeats it in a different way . . . see? Well, that's not really happening as far as I can see anyway in this first part.

110 T: Is that a bad thing to do though?

111 C: To rephrase? Well it's not a bad thing to do . . . I think it's a good

thing to realize that the question has been ambiguous . . . in which case it's an excellent thing to do . . . rephrase the question. But I think it's better if you can anticipate . . .

112 T: And avoid that for starters.

113 C: And avoid that, yes. But I don't see a problem with your questioning here. Perhaps you'll want to keep that in mind and raise something later on if you want.

114 T: O.K.

115 C: Let's just continue then. "Anything else? No? O.K., we're going to look at environmental factors in a little bit different way." Now the lesson sort of shifts here doesn't it.

116 T: Uhmm uhmm. That was the beginning of my introduction . . . what I was going to be going into.

117 C: So, in the terms we've used in class, you've done your "hook" -- you've hooked up to what the kids have done previously in class. So you have them set for the lesson, right? Now, you were wondering a minute ago about your opening statement . . . "You've been looking at environmental factors, I've been told." Well, this whole little episode has occurred in twenty or thirty seconds . . . somewhere in there. And I think it's a nice little link . . . they're hooked right into the frame of mind that they left their last class with. And now you're ready to begin. I guess what I mean to say is that perhaps it would be more useful to think of the entire piece of talk and how it functions, rather than just your opening comment. O.K.?

118 T: The whole introduction then.

119 C: Right, the train of thought. But let me just get this straight. When you began the introduction to this lesson, were you satisfied that the kids knew what an environmental factor is?

120 T: Yes.

The discussion moved on to another portion of Wendy's lesson at this point, thus the cycle of reflection dealing with the lesson introduction came to a close. The use of Clue 2 can now be illustrated by reviewing some of Wendy's utterances that occurred along the way. Clue 2 is concerned with whether there is evidence in the discussion that the teacher shifts from using teacher-centered to using student-centered interpretations of classroom events. In this cycle of reflection Wendy did make such a shift in regard to her views about students "getting the

point." First, from the teacher-centered interpretation, Wendy's conclusion was that the students did not get the point. Notice, again, utterance 66 from Phase I of the cycle:

> . . . Also, down here where the one fellow said that the isopods like to go to the dim parts, I think in that case . . . because that was pretty close to what we were looking for, I should have gotten him to say a little bit more on that.

Later, in Phase III of the cycle, Wendy achieves a new interpretation (utterances 80 and 84):

> Well, actually, when he answers he does say that they like going to the dim parts, so . . . seeing it now . . . he has picked out what I was looking for.
>
> I actually think I should have left it the way it was instead of, you know, kept pushing for something else . . . for them to say, "light" and nothing else. And I think that's . . . from my understanding of it now . . . that's what I was doing. I didn't accept what they said about going to the dim parts. I wanted them to explicitly say "light" and nothing else.

Finally, at the end of the episode (utterance 120) when the supervisor asked Wendy if she was satisfied that the students knew what an environmental factor is, she said, "Yes." These data suggest that Wendy has achieved her new view by shifting to the pupils' perspective in her interpretation of classroom events.

Conclusions

The analysis has led to several conclusions. Generally, Schön's ideas regarding reflection-in-action provide a useful way to interpret how preservice teachers make sense of their early teaching performances. One of the underlying themes of the study is that reflection should not be confused with rationalization. Problem setting and reframing are the categories that alert us to what reflection looks like. Furthermore, the concept of the reflective cycle, which focuses Schön's ideas on the context of teacher education, together with the clue structure presented in this paper, alerts us to what it looks like when a beginning teacher reflects on her own teaching. The analysis of the data shows that problem setting and reframing

(phase I and phase II of the cycle of reflection) can be seen to occur in the discussion with Wendy. The claims are (1) that the clues are faithful to Schön's work, (2) that they do, indeed, detect reflection in clinical supervision dialogue, (3) that the concept of the reflective cycle and its associated clue structure are applicable and appropriate to studying reflection among preservice teachers, and (4) that preservice teachers can reflect, given the proper situation (in particular, the occasion to teach, the transcript and the supervisor). The conceptualization of the reflective cycle, together with the clue structure for detecting reflection in clinical supervision dialogue, is put forward here as a way to provoke and to study reflection-in-action on the part of methods students engaged in the clinical analysis of their own teaching.

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Detecting Reflection-in-Action in

Preservice Elementary Science Teachers

Abstract

This study draws on a conceptualization of the nature of professional knowledge called **"Reflection-in-Action"** put forth by Donald Schon, and seeks to determine whether it is applicable, and appropriate, to studying the way in which education students make sense of practical teaching experiences offered in methods courses. Schon's ideas are taken to the context of teacher education, and an analytical scheme for applying the catergories of reflection-in-action to clinical supervision dialogue is proposed. A conceptualization of the "cycle of reflection" is developed, and a "clue structure," or set of criteria, for detecting reflective activity in clinical supervision is put forth. The use of the clue structure is illustrated with detailed analysis of excerpts from the clinical supervision dialogue with an elementary science methods student.